1926.

FROM

TRANSACTIONS

OF THE

NEW ZEALAND INSTITUTE.

VOLUME 56, pp. 74-80.

# Third Supplement to the Uredinaceae and Ustilaginaceae of New Zealand.

BY

G. H. CUNNINGHAM,

Mycologist, Department of Agriculture, Wellington, N.Z.

ISSUED 6TH MARCH, 1926.

WELLINGTON, N.Z :

W. A. G. SKINNER, GOVERNMENT PRINTER.

1926.

FROM

TRANSACTIONS

OF THE

NEW ZEALAND INSTITUTE,

VOLUME 56, pp. 74-80.

# Third Supplement to the Uredinaceae and Ustilaginaceae of New Zealand.

BY

G. H. CUNNINGHAM,

Mycologist, Department of Agriculture, Wellington, N.Z.

WELLINGTON, N.Z :

W. A. G. SKINNER, GOVERNMENT PRINTER.

1926.

# Third Supplement to the Uredinaceae and Ustilaginaceae of New Zealand.

By G. H. Cunningham, Mycologist, Department of Agriculture, Wellington, N.Z.

[*Read before the Wellington Philosophical Society, 1st October, 1924; received by Editor, Editor, 31st December, 1924; issued separately, 6th March, 1926.*]

## UREDINACEAE.

### ADDITIONAL SPECIES.

The collecting of the following species adds a fourth family to the Uredinaceae of New Zealand.

### CRONARTIACEAE.

Teleutosori subepidermal. Teleutospores unicellular, catenulate, apedicellate, united laterally into columns or pulvinate masses; epispore coloured or hyaline, smooth; basidium external. Uredosori with or without peridia. Uredospores catenulate or borne singly on distinct pedicels. Aecidia present or absent.

This family, although not recognized by certain workers, is, I believe, sufficiently characterized by the catenate teleutospores to warrant retention.

Sydow (*Mon. Ured.*, vol. 3, p. 502, 1915) places *Chrysomyxa* and *Barclayella* in the Chrysomyxeae, a subfamily of the Melampsoraceae.

### Chrysomyxa Unger.

Ung., *Beit. verg. Path.*, p. 24, 1840.

*Melampsoropsis* (Schroet.) Arth., *Res. Sci. Congr. Bot. Vienne*, p. 338, 1906.

Heteroecious. Cycle of development includes 0, I, II, III.

0. Spermogones immersed, flask-shaped.

I. Aecidia erumpent, with definite peridia. Aecidiospores globose to elliptical; catenulate; epispore hyaline, covered with coarse deciduous warts; germ-pores indistinct or wanting.

II. Uredosori with or without peridia, pulverulent, erumpent; peridia, when present, delicate, evanescent. Uredospores catenulate, apedicellate; epispore hyaline, verrucose; germ-pores indistinct.

III. Teleutosori erumpent, waxy, pulvinate, becoming velvety. Teleutospores catenulate, in simple or branched chains, unicellular, elliptical; epispore hyaline, smooth, thin; germ-pore apical, obscure.

Distribution: Europe; Asia; North America; India.

The aecidia, when present, occur on species of *Picea*; the uredo- and teleuto-spores on *Empetrum*, *Pyrola*, *Rhododendron*, and *Ledum*.

The uredospores occur in chains, and peridia may be present or absent; when present they are usually evanescent and difficult to detect, save when sections are made through nearly mature sori. Between the uredospores *in situ* large interstitial cells are present. The teleutospores are catenulate, and become compacted into pulvinate sori. They germinate without a period of rest, giving to the sori a characteristic velvety appearance.

**1. Chrysomyxa Rhododendri** (DC.) de Bary. Ericaceae.

DB., *Bot. Zeit.*, p. 809, 1879.

*Uredo Rhododendri* DC., *Fl. Fr.*, vol. 6, p. 86, 1815.
*Caeoma Rhododendri* Link., *Sp. Pl.*, vol. 2, p. 16, 1825.
*Coleosporium Rhododendri* Schroet., in Cohn's *Beitr.*, Bd. 3, Heft 1, p. 56, 1879.

0. Spermogones amphigenous, flask-shaped, honey-yellow.

I. Aecidia hypophyllous, seated on elongate yellow spots. Peridium irregular, laterally compressed, 0·5–3 mm. long, 0·25–0·75 mm. high, margins hyaline, lacerate. Spores globose, subglobose, or elliptical, 20–44 × 14–20 mmm.* (Sydow); 17–45 × 12–22 mmm. (DB.); epispore hyaline, closely and finely verruculose, save for a smooth longitudinal strip along one side; 2–2·5 mmm thick; germ-pores indistinct.

II. Uredosori hypophyllous, seated on discoloured spots which are visible on the upper surface, minute, 0·2–0·5 mm. diam., circular or irregular, bullate, solitary, or more frequently in scattered groups of 3–15 or more, orange-yellow, ruptured epidermis inevident; peridium delicate, evanescent, hyaline. Spores catenulate, interstitial cells evident, obovate, elliptical or subglobose, 18–26 × 15–21 mmm.; epispore hyaline, closely and finely verruculose; 2–2·5 mmm. thick; cell contents orange-yellow, granular, with one prominent central nucleus; germ-pores indistinct.

III. Teleutosori hypophyllous, seated on small discoloured spots which are visible on the upper surface, minute, 0·2–0·5 mm. diam., circular, pulvinate, brownish-red, ruptured epidermis inevident. Spores catenulate, chains 80–130 mmm. long, shortly cylindrical or prismatic, 20–30 × 10–14 mmm.; epispore hyaline, smooth, 1 mmm. thick, with an annular thickening at the summit of the uppermost cell; germ-pore apical, obscure.

Host: *Rhododendron* sp. cult. On leaves. Herb. No. 1636. II. Stratford, Taranaki, *W. Pettigrew!* 4 Nov., 1924.

Distribution: Europe; Asia.

This species has been introduced from Europe with the host. Only the uredo stage has been collected, and the determination has been made from this. It agrees closely with the published descriptions and with the uredo stage of herbarium specimens in the possession of the writer.

The aecidia occur on *Picea excelsa* and *P. obovata* in Europe, the uredo- and teleuto-spores on numerous species of *Rhododendron*. The life-cycle is but imperfectly known; the teleutospores germinate in early summer, producing basidiospores which may infect the leaves of *Picea*. The resultant aecidiospores may infect *Rhododendron* leaves, and in these the mycelium apparently overwinters, producing uredo- and teleuto-spores the following summer.

PUCCINIACEAE (TRIBE PHRAGMIDEAE).

KUEHNEOLA Magnus.

Mag., *Bot. Centr.*, vol. 74, p. 169, 1898.

Autoecious. Cycle of development includes 0, II, III.

0. Spermogones subcuticular, flattened, hemispherical.

II. Uredosori erumpent, pulverulent, without peridia; of two kinds, primary and secondary. Primary uredosori usually associated with the

* In this article the contraction "mmm." is used for micromillimetres.

spermogones, aparaphysate; secondary uredosori frequently paraphysate. Uredospores borne singly on distinct pedicels; epispore rough, hyaline; germ-pores equatorial (?), obscure.

III. Teleutosori erumpent, aparaphysate. Teleutospores divided by transverse septa into 3–several cells; epispore coloured or subhyaline, smooth; germ-pores solitary, apical; pedicels hyaline, short, fragile.

Distribution: Europe; North and South America; India.

Members of this genus are in Europe confined to the Rosaceae, but in North and South America they occur in addition on the Malvaceae. The solitary New Zealand species has been introduced with the host.

The teleutospores characterize the genus, and appear as if several single teleutospores of some coronate species of Uromyces were superimposed one upon another, the lowest being attached by the pedicel to the sorus.

1. Kuehneola albida Magnus, *l.c.* Rosaceae.

*Chrysomyxa albida* Kuhn, *Bot. Centr.*, vol. 16, p. 154, 1883.
*Uredo Muelleri* Schroet., *Krypt. Fl. Schles.*, vol. 3, p. 375, 1887.
*Phragmidium albidum* Lagerh., *Mitth. Bad. Bot. Verh.*, p. 44, 1888.
*Kuehneola Uredinis* (Link.) Arth., *N. Am. Fl.*, vol. 7, p. 186, 1912.

0. Spermogones epiphyllous, in small groups, seated on discoloured spots, depressed-globose, 0·1–0·2 mm. diam.

II. Primary uredosori epiphyllous, surrounding the spermogones, in crowded groups, 0·5–1·25 mm. across, usually somewhat elongate, often arranged in a circinate manner, bullate, pulverulent, orange-coloured, fading to pallid cream, surrounded by the ruptured epidermis. Secondary uredosori hypopyllous and caulicolous, frequently seated on discoloured spots which are visible on the upper surface, scattered, or more frequently in crowded irregular groups, circular, small, 0·1–0·5 mm. diam., bullate, pulverulent, lemon-yellow, bleaching to a pallid cream-colour with age, aparaphysate. Spores elliptical, obovate, or more rarely subglobose, 20–30 × 17–24 mmm.; epispore hyaline; moderately and bluntly echinulate, 1–1·5 mmm. thick; cell-contents lemon-yellow, vacuolate; germ-pores indistinct (probably 3 or 4, equatorial—Arthur).

III. Teleutosori hypophyllous, scattered or in small groups, circular, 0·2–0·5 mm. diam., pulvinate, tinted yellow, ruptured epidermis inevident. Spores 5–13-celled, commonly 5–6, cylindrical or cylindrical-clavate, 85–110 × 18–24 mmm., each cell 17–40 × 15–24 mmm., trapezoidal, somewhat coronate above; epispore thickened from below upwards, 1·5 mmm. below, apex 3–5 mmm., hyaline or tinted yellow, smooth; pedicel persistent (or wanting), short, hyaline, delicate; germ-pore solitary, situate in one of the projections at the apex of each cell.

Host: *Rubus fruticosus* L. On leaves and stems. Herb. Nos. 246, 1637.

II. Tokomaru, Wellington, *G. H. C.*, 6 Dec., 1920. Kauri Gully, Auckland, *G. H. C.*, 2 Mar., 1921. Helensville, Auckland, *E. Bruce Levy!* 3 Feb., 1921. Opotiki, Auckland, *M. Davey!* 25 Oct., 1920. Te Puke, Auckland, *R. Waters!* 18 Feb., 1922. Wairoa, Hawke's Bay, *E. H. Atkinson!* 12 Oct., 1924.

Distribution: Europe; North America.

The uredo stage only has been collected in New Zealand; this, in a previous paper (*Trans. N.Z. Inst.*, vol. 54, p. 690, 1923), was in error referred to *Gymnoconia Peckiana*, the caeomata of which it resembles closely. Dr. B. O. Dodge (United States Department of Agriculture,

Washington), to whom specimens were submitted, wrote pointing out this error, and in addition forwarded material for comparative purposes. On examination and comparison of the specimens of *Kuehneola albida* kindly forwarded by Dr. Dodge with New Zealand material I find the two to be identical. *Gymnoconia Peckiana* should therefore be deleted from the record of Uredinaceae occurring in New Zealand.

### ADDITIONAL HOSTS.

Puccinia pedatissima G. H. Cunn. (*Trans. N.Z. Inst.*, vol. 54, p. 673, 1923).

Host: *Ourisia macrocarpa* Hook. f. Herb. No. 1633. On leaves. III. Roaring Creek, Arthur Valley, Otago, *E. H. Atkinson!* 18 Jan., 1920.

This host is endemic and confined to the South Island (Cheeseman, *Fl. N.Z.*, p. 549, 1906).

Puccinia Elymi Westnd. (*Trans. N.Z. Inst.*, vol. 55, p. 1).

Host: *Bromus sterilis* L. Herb. Nos. 1638, 1639. On leaves. II–III. Roadside, Ashburton, Canterbury, *J. C. Neill!* 18 Oct., 1924.

This host is an introduced plant, common throughout the agricultural areas of New Zealand.

## USTILAGINACEAE.

### ADDITIONAL SPECIES.

TOLYPOSPORIUM Woronin.

Wor., *Abh. Senck. Nat. Ges.*, vol. 12, p. 577, 1882.

Sori forming a granular spore-mass at maturity, usually in the inflorescence, commonly in the ovaries, formed of numerous spore-balls. Spore-balls consisting of few or many spores, opaque, dark-coloured, permanently united, sterile cells absent.

Spores bound together by ridged thickenings or folds of the epispore, dark-coloured, irregular in shape, smooth or roughened on their free surfaces; germination similar to that of *Ustilago*.

Distribution: Europe; Asia; North and South America; Ceylon; India; Africa; Australia.

The following endemic species is the only one that has been collected in New Zealand. The genus is fairly well represented in Australia, for McAlpine (*Smuts Aus.*, p. 186, 1910) records seven species. Species of the genus are confined to the Gramineae, Cyperaceae, and Juncaceae. The genus is characterized by the very firm spore-balls, their dark colour, and the union of individual spores by folds of the epispore. It is separated from *Thecaphora* by the more compact nature of the spore-balls, and chiefly on account of the much darker colour; from *Sorosporium* in the balls being permanent, although in this latter genus certain species occur in which the balls are also permanent. In such a case they are separated by the presence of (in *Tolyposporium*) the peculiar ridged folds of the epispore.

1. **Tolyposporium littorale** n. sp. (Fig. 1.) Cyperaceae.

Sori in ovaries, usually destroying all in the inflorescence, concealed within the glumes, subglobose to elliptical, 1–2 mm. long, black, at first agglutinated in firm masses, becoming apparent only upon rupture of the

perigynium, when pulverulent and granular. Spore-balls of 20–50 or more spores firmly and permanently united by ridged folds, irregularly elliptical, subglobose or angular, 48–110 × 40–70 mmm., black, opaque.

Spores irregular in size and shape, obovate, cuneate, or angular, 15–25 × 14–20 mmm.; epispore dark brown, smooth on the united faces, covered with coarse deciduous tubercules on the free, 1–2 mmm. thick where smooth, up to 8 mmm. thick on free surface, often with lateral winged projections at margins of free surfaces.

Host: *Cladium Huttoni* T. Kirk. In ovaries. Herb. No. 1640. Seashore, Tauranga Harbour, Auckland, *J. C. Neill! G. H. C.*, 20 Jan., 1924. (Type.)

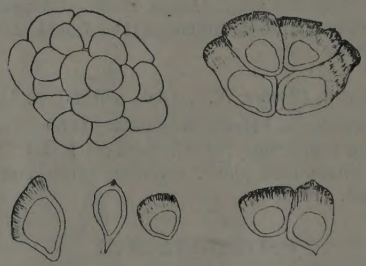

Fig. 1.—*Tolyposporium littorale* G. H. Cunn., on *Cladium Huttoni* T. Kirk: spore-ball (× 320) and spores (× 500).

The host is endemic and confined to the North Island, where it is apparently common on the margin of certain lakes (Cheeseman, *Fl. N.Z.*, p. 787, 1906).

I have been unable to germinate the spores. The spore-balls of this species are so firm that separation of the spores is not possible unless the balls are first boiled in lactic-acid solution, or treated for some time with caustic-soda solution. The spores appear as if covered on their free surfaces with large, irregular, deciduous tubercules, the crevices between giving to the spores a decidedly areolate appearance The spores are not unlike those of *T. lepidosperma* McAlp., in that they are thickened and much roughened on their free surfaces, but the spore-balls are quite distinct, being much larger in size, more irregularly angular in shape, and spores are much larger.

### Farysia Raciborski.

In a former paper on the Ustilaginaceae of New Zealand (*Trans. N.Z. Inst.*, vol. 55, p. 414, 1924) the name *Elateromyces* Bubak was used for a genus characterized by the presence of "elaters" in the sori. I find that the name *Farysia* was used by Raciborski for a species (*F. javanica* Racib.) possessing this same character, and, as Raciborski's name has priority, the three species included in *Elateromyces* should be cited as under:—

Farysia Raciborski, *Bull. Acad. Sci. Cracovic*, p. 354, 1906.

*F. nigra* n. comb.
Syn. *Elateromyces niger* G. H. Cunn.

*F. olivacea* (DC.) Sydow, *Ann. Myc.*, vol. 17, p. 42, 1919.
Syn. *Elateromyces olivaceus* (DC.) Bubak.

*F. endotricha* (Berk.) Sydow, *l.c.*
Syn. *Elateromyces endotrichus* (Berk.) G. H. Cunn.

When in England recently I examined the type of this last species (Herb. Kew., No. 4748), and find that the description given in my former paper is inaccurate, the spores especially being wrongly described. The following amended description has been drawn up from the type specimen :—

Farysia endotricha (Berkeley) Sydow, *l.c.* (Fig. 2.) Cyperaceae.

Sori on peduncles and main axes of the inflorescences, *not* in ovaries, jet-black, compact, elliptical, up to 20 mm. long, 8 mm. wide; elaters short, up to 5 mm. long, stout, black, curled, giving to the sorus a decidedly velvety appearance.

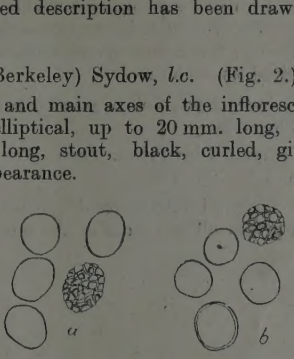


FIG. 2.—*Farysia endotricha* (Berk.) Syd.: *a*, spores from *Gahnia pauciflora* T. Kirk; *b*, spores from type material at Kew; both × 500.

Spores globose or shortly elliptical, 12–18 mmm. diam.; epispore dark-olivaceous or dark chestnut-brown, 1 mmm. thick, covered with numerous flattened irregular tubercules, the crevices between giving a distinct areolate appearance to the spores.

Hosts :—

*Gahnia* sp. On peduncles. Type: Herb. Berk., Kew, No. 4748. Auckland, *Sinclair!*

*Gahnia pauciflora* T. Kirk. On peduncles. Herb. No. 2190. Silverstream, Upper Hutt, Wellington, *H. Hamilton!* Jan., 1924.

The latter host is endemic, and not uncommon throughout both Islands (Cheeseman, *Fl. N.Z.*, p. 793, 1906). With this emended description it will be seen that the areolate nature of the epispore markings separates this from the other two species recorded from New Zealand. The figure given by Berkeley is inaccurate in that the elaters are much exaggerated, and the spores do not arise from them as his figure represents.

In the *Farysia* (*Ustilago*) *endotricha* folder at Kew (labelled "*U. trichophora* Kunze") are numerous collections. In working over these I found that only the type collection, consisting of one specimen from which Berkeley prepared his illustration, is of this species, all others being *Farysia olivacea* (DC.) Syd. This applies also to the "co-type" specimen of Cooke, which was acquired when his herbarium was bought by the Kew authorities.

## ADDITIONAL HOST.

Ustilago Avenae Jens. (*Trans. N.Z. Inst.*, vol. 55, p. 405, 1924).

Host: *Avena sativa* L. In inflorescences. Herb. Nos. 1496, 1501. Tapanui, Otago, *J. C. Neill! G. H. C.*, 12 Feb., 1924. Winton, Southland, *J. C. Neill!* 15 Feb., 1924.

## NOTE.

Urocystis Anemones = Tuburcinia Anemones.

In a recent paper Liro has shown, as a result of examination of the original material, that *Tuburcinia* Fries and *Urocystis* Rabh. are identical. As *Tuburcinia* has priority, this name should replace *Urocystis*. The genus should therefore be cited as under :—

TUBURCINIA Fries, *Syst. Myc.*, vol. 3, p. 439, 1832; and the species on p. 430 of my previous paper,—

*T. Anemones* (Pers.) Liro, *Ann. Univ. Fennicae Aboensis* ser. A, tom. 1, No. 1, p. 55, 1922.

Liro has split the original into several species; but to me, judging from the descriptions given, all are races of the one species.

[110/11/25—12898